

Combined long term monitoring approach to investigate flow fields and changes in floodplain geomorphology using stationary ADCPs, sediment traps and geodetic surveys

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The success of plans and measures to restore floodplains and designate new flood retention areas for rivers depends on a fundamental understanding of the boundary conditions during flood events. Hydraulic conditions interact directly with vegetation and morphology and have a decisive impact on sedimentation and erosion. While the technical development of numerical and physical modelling of floodplain hydraulics has made a great progress during the last decades, up till now field investigations during flood events and for several years are very seldom. In this context, changes in geomorphology and the impact of different types of vegetation structures on the flow field has been systematically studied over a period of several years at floodplain sites of the Upper Rhine. Using sediment traps and geodetic surveys, yearly and spatial changes of sedimentation and erosion as well as the evolution of floodplain geomorphology could be investigated over a period of nine years. Besides this, the overall aim of this investigation was to carry out in situ flow velocity measurements during entire flood events to get better information about the evolution of hydraulics under different conditions and to understand under which circumstances erosion and sedimentation take place at typical riparian vegetation sites. The decisive impact of vegetation on hydraulics was monitored online via remote control for several flood events with two Acoustic Doppler Current Profilers which were mounted at the floodplain bottom. The design of experiment allows comparative studies of flow fields under the influence of different types of riparian vegetation and under non-stationary conditions, for longer periods and with respect to differences in the flow field caused by willows and grass. After completion of the installation in 2001, several investigations were carried out since then. Concerning the results of this experimental design, particular importance is attached to describing and comparing the temporal and spatial variations of flow velocity and its intensity at different water levels for an entire flood event and between different events.